



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/547,445	06/08/2006	Arun Wagh	166538025US1	1664
25996 7590 03/23/2009 PERKINS COIE LLP PATENT-SEA P.O. BOX 1247 SEATTLE, WA 98111-1247			EXAMINER HAN, SHENG	
			ART UNIT 1793	PAPER NUMBER
			MAIL DATE 03/23/2009	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary**Application No.**

10/547,445

Applicant(s)

WAGH ET AL.

Examiner

SHENG HAN

Art Unit

1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 3, 5, 8, 9, 13, 16, 18, 22, 24, 27, 28, 30, 32-34 and 38-56 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1, 3, 5, 8, 9, 13, 16, 18, 22, 24, 27, 28, 30, 32-34, 38-56 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____.

DETAILED ACTION

Response to Arguments

Applicant's arguments, see Amendment in Response to Non-Final Office Action, filed 12/08/08, with respect to the rejection(s) of claim(s) 1,3,5,8,9,13,16-18,22-24,27,28,30,32-34 and 38-49 under the First Office Action have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Singh (6153809) and Mitsubishi Atomic Power Ind (JP 63015200).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 16 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Specifically, in Claim 16, the process provides that water is added, then removed forming a residual waste and water mixture. Then the claim calls for preparing a slurry with the waste and water mixture. It is unclear whether this is the same residual water mixture or a fresh supply of water.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated over Singh (6153809).

Singh teaches that it is known to use a method of stabilizing radioactive and hazardous wastes using a phosphate ceramic having a high structural integrity (col. 2, lines 12-13). These phosphate forms are bound by either ionic or covalent bonds (col. 2, lines 8-9). As an example, Singh teaches reacting magnesium oxide to a solution of phosphoric acid to form a bonded solution (col. 2, equation 1), where it is used to encapsulate the waste (col. 2, lines 27-28). Finally, Singh teaches that a porous ceramic product results upon evaporation of the water (col. 2, lines 31-32).

With regard to the solution curing, Singh teaches that the slurry is allowed to set after a time (col. 9, lines 4-5).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 16, 17, 18, 24, 52 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsubishi Atomic Power Ind (JP 63015200).

Mitsubishi Atomic Power teaches a method of stabilizing radioactive boric acid liquid waste discharge from an atomic power station by treating the solution with a mixture of phosphoric acid, an alkali metal or an alkali salt of phosphoric acid and B₂O₃ in an amount corresponding to the amount of waste present (abstract). The compound is subsequently heated so that waster is removed and the resultant product is calcinated to form a phosphate glass product.

Regarding Claim 16, Mitsubishi Atomic Power teaches a method of stabilizing radioactive boric acid liquid waste discharge from an atomic power station by treating the solution with a mixture of phosphoric acid, an alkali metal or an alkali salt of phosphoric acid and B₂O₃ in an amount corresponding to the amount of waste present (abstract). The compound is subsequently heated so that waster is removed and the resultant product is calcinated to form a phosphate glass product. The sludge starting waste material inherently includes waste and water. Although Mitsubishi does not specifically teach first removing the water and then adding the oxide binder and the phosphate binder prior to allowing the slurry to cure, it would have been obvious to one of ordinary skill in the art at the time of the invention to heat the solution to remove

water prior to adding the oxide and phosphate mixture because phosphate solidifies at a lower temperature. Therefore, it would be obvious to remove excess water prior to adding the phosphate because it would be easier to do so prior to when it hardens.

Regarding Claim 17, Mitsubishi teaches heating the composition in order to remove water.

Regarding Claim 18, Mitsubishi does not teach remove water at 90% by weight of the solids and water mixture, however, since it is the object of the invention to stabilize the waste, it would have been obvious to one of ordinary skill in the art at the time of the invention to remove the most residual product possible in order to form a more solidified waste form.

Regarding Claim 24, Mitsubishi teaches adding a reducing agent (alkali phosphate salt) and an oxidizing agent (alkaline oxide).

Regarding Claim 52, Mitsubishi teaches removing bound water from the composition after adding the phosphate ceramic mixture.

Regarding Claim 53, Mitsubishi teaches removing bound water from the composition after adding the phosphate ceramic mixture.

Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsubishi or Singh.

Mitsubishi and Singh discuss a method for stabilizing wastes using phosphate ceramic, water, and an oxide binder, followed by curing. They teach heating the composition so that water is removed. Although neither of them teach doing this step in a vacuum chamber, it would have been obvious to one of ordinary skill in the art at the time of the invention to use any method that would facilitate the dewatering process, including using a dewatering chamber.

Claims 3, 8, 27, 28, 32, 33, 34, 38, 39 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Singh (6153809) and further in view of Wagh (5645518).

Singh teaches a method for stabilizing radioactive wastes using phosphate ceramics, while evaporating the water from the solution, but does not teach maintaining that temperature under what would cause the ceramic matrix to be volatilized.

Wagh teaches a method for stabilizing wastes using phosphate ceramic, water, and an oxide binder (abstract). Wagh further teaches that the slurry is heated to a temperature anywhere less than 100°C (col. 6, line 29), where the slurry is subsequently slowly allowed to cure (col. 10, line 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention however to maintain the temperature of the ceramic at below a temperature where the hydrated ceramic matrix would be volatilized because although water is to be

evaporated from the structure, the hydrated ceramic matrix should be not rendered unstable since that would jeopardize its ability contain the hazardous waste.

Regarding Claim 8, Singh teaches that while waiting for the slurry to cure, it is mixed (col. 9, lines 3-6).

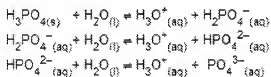
Regarding Claim 27, Singh and Wagh teach a method for stabilizing waste using a phosphate ceramic, water and an oxide binder while heating the solution up to 100 degrees Celsius, which inherently evaporates water. Singh further teaches that while waiting for the slurry to cure, it is mixed (col. 9, lines 3-6). It would have been obvious to one of ordinary skill in the art at the time of the invention to stir the composition while waiting for water to evaporate because it speeds up the evaporation process by aiding water vapor trapped in the lower parts of the composition to evolve.

Regarding Claim 28, Wagh teaches heating at 100°C (claim 7) where water evaporates, but this is below a temperature where non-water components would be volatile (Applicant's specification, PG Pub, para. 0045, under 200°C).

Regarding Claim 32, Wagh teaches use of Zn(OH)_4 as the reducing agent (abstract) and MgO is an oxidizing agent (col. 3, line 49, Equation 1) prior to allowing it to cure.

Regarding Claim 33, Wagh teaches a method for stabilizing wastes using phosphate ceramic, water, and an oxide binder, followed by curing (abstract), but Wagh does not teach that the phosphate binder is KH_2PO_4 , Wagh does disclose that the oxide binder is MgO , (Mg is a divalent metal) and the phosphate binder is H_3PO_4 (col. 3, line 49, Equation 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention that H_3PO_4 naturally disassociates into H_2PO_4^- with water. Therefore, use of H_3PO_4 is equivalent to use of KH_2PO_4 (col. 4, lines 14-16, dilute phosphoric acid or acid phosphate solutions).



Regarding Claim 34, Wagh teaches adding MgO which will inherently increases the pH of the slurry (table 1).

Regarding Claim 38, Wagh teaches that the waste is a salt waste (col. 4, line 53) and that a neutralizing agent is added (col. 4, line 67, heavy metals or col. 6, line 39, addition of boric acid) prior to allowing the composition to cure. Although Wagh does not specifically instruct on the pH level of the compound, it is inherent that the waste has a first pH level and that subsequent to adding a neutralizing agent, that there would be a second pH level different from the first.

Regarding Claim 39, Wagh teaches use of the composition with radioactive material (col. 4, line 12), but does not specifically teach use of a beta-absorptive, gamma-absorptive, alpha-absorptive or neutron-absorptive. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a suitable radiation blocker to contain the radiation emitting from the material.

Regarding Claim 49, Wagh teaches use of the composition with radioactive material (col. 4, line 12), but does not specifically teach use of a beta-absorptive, gamma-absorptive, alpha-absorptive or neutron-absorptive. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a suitable radiation blocker to contain the radiation emitting from the material.

Claims 41, 43, 44, 45, 46, 47, 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsubishi Atomic Power Ind as applied to claim 1 above, and further in view of Singh (6153809) and further in view of Wagh (5645518).

Singh teaches a method for stabilizing radioactive wastes using phosphate ceramics, while evaporating the water from the solution, but does not teach maintaining that temperature under what would cause the ceramic matrix to be volatilized.

Wagh teaches a method for stabilizing wastes using phosphate ceramic, water, and an oxide binder (abstract). Wagh further teaches that the slurry is heated to a temperature anywhere less than 100°C (col. 6, line 29), where the slurry is subsequently

slowly allowed to cure (col. 10, line 1). Wagh teaches use of a neutralizing material to the waste to partially neutralize the waste before it is combined with oxide and phosphate binders (col. 4, line 67 or col. 9, line 46).

It would have been obvious to one of ordinary skill in the art at the time of the invention however to maintain the temperature of the ceramic at below a temperature where the hydrated ceramic matrix would be volatilized because although water is to be evaporated from the structure, the hydrated ceramic matrix should be not rendered unstable since that would jeopardize its ability contain the hazardous waste.

Regarding Claim 43, Wagh teaches use of a H₂ getter agent (table 1, MgO).

Regarding Claim 44, Wagh teaches use of MgO, which is a metal oxide (table 1).

Regarding Claim 45, Wagh teaches use of phosphoric acid, which is an acid that would reduce the pH (table 1).

Regarding Claim 46, Wagh teaches use of a salt to the slurry (table 1, crushed dibasic sodium phosphate).

Regarding Claim 47, Wagh teaches use of Zn(OH)₂ as the reducing agent (abstract) and MgO is an oxidizing agent (col. 3, line 49, Equation 1).

Regarding Claim 48, Wagh teaches addition of a compound that reacts and heats with another compound in the slurry making it exothermic (col. 4, lines 14-16).

Claims 5, 40, 42, 54 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Singh or Mitsubishi Atomic Power as applied to claim 1 above, and further in view of Sato (JP 2002131481).

Mitsubishi Atomic Power teaches a method of stabilizing radioactive boric acid liquid waste discharge from an atomic power station by treating the solution with a mixture of phosphoric acid, an alkali metal or an alkali salt of phosphoric acid and B_2O_3 in an amount corresponding to the amount of waste present (abstract). The compound is subsequently heated so that water is removed and the resultant product is calcinated to form a phosphate glass product. Mitsubishi Atomic Power does not specify whether the water can be removed prior to mixing the radioactive solution with the phosphate ceramic mixture however.

Sato teaches a method of handling a waste sludge by first dehydrating the sludge then solidifying in with cement with varying chemical compositions.

It would have been obvious to one of ordinary skill in the art at the time of the invention to dehydrate some of the waste, as taught by Sato, prior to mixing in the ceramic binders in the system taught by Mitsubishi because dehydrating can make the waste more manageable, and since the phosphate ceramic solidifies at lower

temperatures, it would be obvious to dehydrate the waste prior to mixing in the ceramic compositions.

Regarding Claim 40, Sato teaches dewatering the composition prior to adding the admixtures and then cementing the composition.

Regarding Claim 42, Sato teaches dewatering the composition prior to adding the admixtures and then cementing the composition.

Regarding Claim 54, Mitsubishi Atomic Power teaches a method of stabilizing radioactive boric acid liquid waste discharge from an atomic power station by treating the solution with a mixture of phosphoric acid, an alkali metal or an alkali salt of phosphoric acid and B_2O_3 in an amount corresponding to the amount of waste present (abstract). The compound is subsequently heated so that water is removed and the resultant product is calcinated to form a phosphate glass product. Mitsubishi Atomic Power does not specify whether the water can be removed prior to mixing the radioactive solution with the phosphate ceramic mixture however.

Sato teaches a method of handling a waste sludge by first dehydrating the sludge then solidifying in with cement with varying chemical compositions. It would have been obvious to one of ordinary skill in the art at the time of the invention to dehydrate some of the waste, as taught by Sato, prior to mixing in the ceramic binders in the system taught by Mitsubishi because dehydrating can make the waste more

manageable, and since the phosphate ceramic solidifies at lower temperatures, it would be obvious to dehydrate the waste prior to mixing in the ceramic compositions.

Regarding Claim 56, Sato teaches use of a sludge waste composition.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singh or Mitsubishi Atomic Power as applied to claim 1 above, and further in view of Cohan (5653872).

Singh and Mitsubishi Atomic Power teach methods of stabilizing wastes by using a mixture of phosphorus, oxides and other compositions to form a solidified composition while removing water. Neither Singh or Mitsubishi teach removing water from the slurry while mixing it.

Cohan teaches a process for treating an aqueous sludge waste material that includes mixing the sludge with previously dried solids, applying pressure to the composition and then drying it (abstract). Cohan further explains that prior to mixing the waste, water is removed (Claim 1). Additionally, Cohan explains that phosphates can be added to the waste as an additive (col. 3, line 61).

It would have been obvious to one of ordinary skill in the art at the time of the invention to mix the solution while allowing it to cure, as taught by Cohan, with the system as taught by Mitsubishi because water trapped below the composition can more easily evaporate if the product is aerated.

Claims 9, 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Singh *or* Mitsubishi Atomic Power and Cohan as applied to claim 8 above, and further in view of Wagh (5645518).

Singh and Mitsubishi Atomic Power teach methods of stabilizing wastes by using a mixture of phosphorus, oxides and other compositions to form a solidified composition while removing water. Neither Singh or Mitsubishi instruct on a maximum temperature and a minimum temperature for the purpose of curing with making non-water components volatile.

Wagh teaches a method for stabilizing wastes using phosphate ceramic, water, and an oxide binder (abstract). Wagh teaches heating at 100°C (claim 7). Wagh further teaches that the slurry is heated to a temperature anywhere less than 100°C (col. 6, line 29). Wagh teaches heating at 100°C (claim 7) where water evaporates, but below a temperature where non-water components would be volatile.

It would have been obvious to one of ordinary skill in the art at the time of the invention to not make volatile the non-water components of the ceramic because those include radioactive compounds and additives used to control and stabilize those radioactive compounds.

Regarding Claim 13, Wagh teaches use of a reducing agent (boric acid (col. 9, line 54) and an oxidizing agent (MgO, Table 1).

Claims 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsubishi Atomic Power Ind as applied to claim 16 above, and further in view of Francis (2003/0131759).

Mitsubishi Atomic Power teach methods of stabilizing wastes by using a mixture of phosphorus, oxides and other compositions to form a solidified composition while removing water. Mitsubishi teaches use of an oxide binder as a divalent metal oxide (B_2O_3) and teaches use of an alkali metal salt of phosphoric acid, such as boron phosphate (abstract). Although potassium phosphate is one type of an alkaline salt of phosphoric acid, Mitsubishi does not specifically teach potassium phosphate.

Francis teaches a method of stabilizing wastes using a metal oxide, phosphate, reactive material and water (para. 0011). The reference further teaches removing water from the phosphate slime (para. 0034), addition of an oxide binder (para. 0036, 0038), and the addition of a phosphate binder (para. 0038). It would have been obvious to one of ordinary skill in the art at the time of the invention to use a type of alkaline salt of phosphoric acid, as taught by Mitsubishi, such as potassium phosphate, as taught by Francis because both are alkaline phosphates and can be expected to perform similar results under similar conditions.

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsubishi and Francis as applied to claim 22 above, and further in view of Wagh (5645518).

Mitsubishi and Francis teach a method of stabilizing waste using an alkaline salt of phosphoric salt and an alkali metal oxide, X_2O_3 (abstract), but does not specifically teach that this alkali metal oxide is MgO .

Wagh teaches a method for stabilizing wastes using phosphate ceramic, water, and an oxide binder (abstract). Wagh teaches heating at $100^{\circ}C$ (claim 7), which would inherently evaporate water. Furthermore, Wagh discusses adding MgO to the stabilization composition (col. 9, line 44).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a type of alkaline oxide, as taught by Mitsubishi and Francis, such as magnesium oxide, as taught by Wagh because both are alkaline oxides and can be expected to perform similar results under similar conditions.

Claim 30 is rejected under 35 U.S.C. 103(a) as unpatentable over Singh (6153809) and Wagh (5645518) as applied to Claim 27, and further in view of Mitsubishi and further in view of Francis.

Singh and Wagh teach a method for stabilizing wastes using phosphate ceramic, water, and an oxide binder, followed by curing. Wagh further discusses heating the composition up to 100 degrees Celsius, whereby water would inherently be evolved. Neither references teach use of KH_2PH_4 however.

Mitsubishi Atomic Power teach methods of stabilizing wastes by using a mixture of phosphorus, oxides and other compositions to form a solidified composition while

removing water. Mitsubishi teaches use of an oxide binder as a divalent metal oxide (B_2O_3) and teaches use of an alkali metal salt of phosphoric acid, such as boron phosphate (abstract). Although potassium phosphate is one type of an alkaline salt of phosphoric acid, Mitsubishi does not specifically teach potassium phosphate.

Francis teaches a method of stabilizing wastes using a metal oxide, phosphate, reactive material and water (para. 0011). The reference further teaches removing water from the phosphate slime (para. 0034), addition of an oxide binder (para. 0036, 0038), and the addition of a phosphate binder (para. 0038).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use an alkaline salt as taught by Mitsubishi, in the process as described by Singh and Wagh because the alkaline salt is a known compound for use in stabilizing waste products.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a type of alkaline salt of phosphoric acid, as taught by Mitsubishi, such as potassium phosphate, as taught by Francis because both are alkaline phosphates and can be expected to perform similar results under similar conditions.

Claim 51 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singh (6153809) and Wagh (5645518) as applied to claim 3 above, and further in view of Wagh, and Grover (Wagh, A.S., Grover, S. and Jeong, S.Y. "Chemically Bonded Phosphate Ceramics II. Warm-temperature Process for Alumina Ceramics").

Singh and Wagh teach a method for stabilizing wastes using phosphate ceramic, water, and an oxide binder, followed by curing. Wagh further discusses heating the composition up to 100 degrees Celsius, whereby water would inherently be evolved. Neither reference goes into the higher second temperature ceiling however. Although it would have been obvious to one of ordinary skill in the art at the time of the invention to keep the temperature low enough so that radioactive compositions and the stabilizing agents are not volatilized or destabilized, such as in temperatures above 200 degrees Celsius. However, this temperature ceiling is further discussed by Wagh and Grover.

Wagh and Grover teach the solidification of chemically bonded phosphate ceramics and the kinetics of formation of aluminum phosphate ceramics between the temperature of 100-150 degrees Celsius (Abstract). Wagh and Grover teach that at between 114 to 131 degrees Celsius the solubility of the protective layers of bohmite AlOOH and aluminum hydroxide $\text{Al}(\text{OH})_3$ is enhanced and contributes to the formation of the bonding phase (Pg. 2, para. 3). Furthermore, monoaluminum phosphate was able to bond to these alumina particles at a temperature of about 150 degrees Celsius to form a monolith ceramic (pg. 2, para. 3).

It would have been obvious to one of ordinary skill in the art at the time of the invention to set a temperature ceiling, as taught by Wagh and Grover with the system of stabilizing phosphate ceramics because monoaluminum phosphate bonds well with alumina particles at a temperature range of about 150 degrees Celsius.

Claim 55 is rejected under 35 U.S.C. 103(a) as being unpatentable over Singh (6153809) or Mitsubishi and Sato as applied to claim 54 above, and further in view of Wagh and Grover (Wagh, A.S., Grover, S. and Jeong, S.Y. "Chemically Bonded Phosphate Ceramics II. Warm-temperature Process for Alumina Ceramics").

Singh or Mitsubishi and Sato teach a method of stabilizing waste using a phosphate and oxide mixture to form a solid encasing, which removes water either prior (heating the composition to 100 degrees Celsius under Singh or dewatering a waste sludge under Sato) or afterwards (removing water to form a crystalline compound under Mitsubishi) and which includes the temperature of 100 degrees Celsius. Although Mitsubishi discusses heating the composition to remove bound water after adding the phosphate and oxide composition, Mitsubishi does not specifically state that this second temperature is between 10 to 200 degrees Celsius. However, it would have been obvious to one of ordinary skill in the art at the time of the invention that in order to evaporate water, the temperature of the system should at least reach 100 degrees but to remove bound water the compound can be heated to higher than 100 degrees Celsius.

Wagh and Grover teach the solidification of chemically bonded phosphate ceramics and the kinetics of formation of aluminum phosphate ceramics between the temperature of 100-150 degrees Celsius (Abstract). Wagh and Grover teach that at between 114 to 131 degrees Celsius the solubility of the protective layers of boehmite AlOOH and aluminum hydroxide $\text{Al}(\text{OH})_3$ is enhanced and contributes to the formation of the bonding phase (Pg. 2, para. 3). Furthermore, monoaluminum phosphate was

able to bond to these alumina particles at a temperature of about 150 degrees Celsius to form a monolith ceramic (pg. 2, para. 3).

Since water is trapped in the ceramic, it would have been obvious to one of ordinary skill in the art at the time of the invention to heat the water about 150 degrees Celsius, as taught by Wagh and Grover with the composition as taught by Singh or Mitsubishi and Sato, however, it is further obvious to one of ordinary skill in the art at the time of the invention to heat the water about 150 degrees Celsius after the addition of phosphate and the oxide because that is the temperature where the strong bonds between them can form.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SHENG HAN whose telephone number is (571)270-5823. The examiner can normally be reached on Monday-Thursday, 7:30-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Melvin Curtis Mayes can be reached on 571-272-1234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Sheng Han
Examiner
Art Unit 1793

SH
March 11, 2009

/Melvin Curtis Mayes/
Supervisory Patent Examiner, Art Unit 1793